



## General

### Guideline Title

EFNS guideline on the management of community-acquired bacterial meningitis: report of an EFNS Task Force on acute bacterial meningitis in older children and adults.

### Bibliographic Source(s)

Chaudhuri A, Martinez-Martin P, Kennedy PG, Andrew Seaton R, Portegies P, Bojar M, Steiner I, EFNS Task Force. EFNS guideline on the management of community-acquired bacterial meningitis: report of an EFNS Task Force on acute bacterial meningitis in older children and adults. *Eur J Neurol*. 2008 Jul;15(7):649-59. [13 references] [PubMed](#)

### Guideline Status

This is the current release of the guideline.

The European Federation of Neurological Societies (EFNS) reaffirmed the currency of this guideline in 2013.

## Regulatory Alert

### FDA Warning/Regulatory Alert

Note from the National Guideline Clearinghouse: This guideline references a drug(s) for which important revised regulatory and/or warning information has been released.

- [May 12, 2016 – Fluoroquinolone Antibacterial Drugs](#) : The U.S. Food and Drug Administration (FDA) is advising that the serious side effects associated with fluoroquinolone antibacterial drugs generally outweigh the benefits for patients with sinusitis, bronchitis, and uncomplicated urinary tract infections who have other treatment options. For patients with these conditions, fluoroquinolones should be reserved for those who do not have alternative treatment options.

## Recommendations

### Major Recommendations

The levels of evidence (class I-IV) supporting the recommendations and ratings of recommendations (A-C, Good Practice Points) are defined at the end of the "Major Recommendations" field.

## Early Management of Acute Bacterial Meningitis (ABM)

The Task Force recommends (see the flow chart in the original guideline document) that all patients with suspected ABM should be hospitalized as soon as possible [IIIA]. Care of patients with suspected ABM should be considered as an emergency and fast-tracked for rapid assessment and treatment. The following timeline for management of ABM is proposed: admission to hospital within first 90 minutes (min) of making contact with health service; and assessment and treatment commenced within 60 min of hospital admission, and no longer than 3 hours (h) after contact with health service [IVC].

Pre-hospital antibiotic treatment should only be initiated for patients with strong suspicion of disseminated meningococcal infection (meningococemia) because of the unpredictable risk of early circulatory collapse from adrenocortical necrosis (Waterhouse–Friderichsen syndrome). For other patients, rapid preadmission antibiotic therapy should be considered only if a delay in excess of 90 min in hospital transfer is anticipated [IIIC].

Lumbar puncture (LP) and cerebrospinal fluid (CSF) analysis is the specific investigation required for diagnosis and management of ABM. Therefore, if diagnosis of bacterial meningitis is suspected and there are no clinical contraindications, LP should be performed as soon as safely possible [IIIC].

In patients with symptoms and signs suggestive of raised intracranial pressure or with high risk of cerebral herniations following LP (imaging evidence of intracranial mass lesion, obstructive hydrocephalus or midline shift), diagnostic LP should be postponed [IA].

In a patient with suspected ABM in whom LP is being delayed or postponed, antibiotic therapy should be commenced immediately after collecting blood sample for culture. Intravenous (IV) or intramuscular (IM) Benzyl Penicillin, or IV Cefotaxime or Ceftriaxone should be administered as empirical therapy for ABM and may be commenced immediately [IIIA].

In patients with known history of severe beta-lactam allergy, vancomycin should be administered as the alternative for pneumococcal meningitis and chloramphenicol for meningococcal meningitis [IVC].

In regions with known or suspected penicillin-resistant strains of pneumococcus, high dose vancomycin should be used in combination with a third-generation cephalosporin [IVC].

Patients with risk factors for Listerial meningitis (old age, immunosuppressed and/or signs of rhombencephalitis) should receive IV amoxicillin in addition to a third-generation cephalosporin as the empirical treatment of ABM initially [IVC].

Dexamethasone in high doses may be appropriate as an adjunctive therapy and should be given shortly before or with the first dose of antibiotics (see Adjunctive Therapy on ABM below).

All ABM patients should be managed as medical emergencies and when available, treated in neurological intensive care units.

### Specific Antibiotic Treatment

Initial antibiotic treatment of ABM should be parenteral [IA].

### Empirical Antibiotic Therapy in Suspected ABM

Ceftriaxone 2 g 12 to 24 hourly or Cefotaxime 2 g 6 to 8 hourly [IIIB]

Alternative therapy: Meropenem 2 g 8 hourly [IIIC] or Chloramphenicol 1 g 6 hourly.

If penicillin or cephalosporin-resistant pneumococcus is suspected, use Ceftriaxone or Cefotaxime plus Vancomycin 60 mg/kg/24 hourly (adjusted for creatinine clearance) after loading dose of 15 mg/kg [IVA].

Ampicillin/Amoxicillin 2 g 4 hourly if *Listeria* is suspected [IVA].

### Pathogen Specific Therapy

Penicillin-sensitive Pneumococcal meningitis (and including other sensitive Streptococcal species): Benzyl Penicillin 250,000 Units/kg/day (equivalent to 2.4 g 4 hourly) [IVA] or Ampicillin/Amoxicillin 2 g 4 hourly or Ceftriaxone 2 g 12 hourly or Cefotaxime 2 g 6 to 8 hourly. Alternative therapy: Meropenem 2 g 8 hourly [IVC] or Vancomycin 60 mg/kg 24 hourly as continuous infusion (adjusted for creatinine clearance) after 15 mg/kg loading dose aiming for serum levels of 15 to 25 mg/l plus Rifampicin 600 mg 12 hourly [IVC] or, Moxifloxacin 400 mg daily [IVC]

Pneumococcus with reduced susceptibility to penicillin or cephalosporins: Ceftriaxone or Cefotaxime plus Vancomycin ± Rifampicin [IV]. Alternative therapy: Moxifloxacin, Meropenem or Linezolid 600 mg combined with Rifampicin [IV]

Meningococcal meningitis: Benzyl Penicillin or Ceftriaxone or Cefotaxime [IV]. Alternative therapy: Meropenem or Chloramphenicol or Moxifloxacin [IVC]

*Haemophilus influenzae* type B (Hib): Ceftriaxone or Cefotaxime [IVC]. Alternative therapy: IV Chloramphenicol–Ampicillin/ Amoxicillin [IVC]

Listerial meningitis: Ampicillin or Amoxicillin 2 g 4 hourly ± Gentamicin 1 to 2 mg 8 hourly for the first 7 to 10 days [IVC]. Alternative

therapy: Trimethoprim–Sulfamethoxazole 10 to 20 mg/kg 6 to 12 hourly or Meropenem [IV]

Staphylococcal species: Flucloxacillin 2 g 4 hourly [IV] or Vancomycin if penicillin allergy is suspected [IV]. Rifampicin should also be considered in addition to either agent, and Linezolid for methicillin-resistant staphylococcal meningitis [IVC].

Gram-negative Enterobacteriaceae: Ceftriaxone or Cefotaxime or Meropenem

Pseudomonal meningitis: Meropenem ± Gentamicin

### Duration of Therapy

Unspecified bacterial meningitis: 10 to 14 days [IVC]

Pneumococcal meningitis: 10 to 14 days [IVA]

Meningococcal meningitis: 5 to 7 days [IVA]

Hib meningitis: 7 to 14 days [IVB]

Listerial meningitis: 21 days [IVB]

Gram-negative bacillary and Pseudomonal meningitis: 21 to 28 days [IVB]

### Adjunctive Therapy of ABM

Adjuvant dexamethasone is recommended with or shortly before the first parenteral dose of antibiotic in all previously well and non-immunosuppressed adults with pneumococcal meningitis at a dose of 10 mg every 6 hours for 4 days [IA] and children at a dose of 0.15 mg/kg every 6 hours for 4 days for Hib and pneumococcal meningitis [IA].

In all patients with clinically suspected pneumococcal (or Hib) meningitis (early focal neurological signs), the Task Force recommends that dexamethasone is given with the first dose of empirical antibiotic therapy as above [IVC].

In ABM because of other bacterial aetiology, routine use of high dose dexamethasone is not presently recommended [IA].

If dexamethasone was initiated on clinical suspicion of ABM, which was subsequently proven to be inaccurate by CSF microbiology, the treatment should be promptly withdrawn.

There is insufficient evidence to recommend the use of dexamethasone in pharmacological doses after antibiotic therapy has begun. Dose and duration of therapy with corticosteroids in such cases should be guided by specific clinical indications in individual patients (e.g., physiological doses of steroids in cases of adrenal insufficiency because of meningococemia, pharmacological doses of steroids for raised intracranial pressure).

By reducing subarachnoid space inflammation and blood brain barrier permeability, steroids may lower CSF penetration of antibiotics and patients receiving vancomycin for penicillin-resistant pneumococcal meningitis require close clinical and CSF monitoring.

### Other Symptomatic and Adjunctive Therapies

Circulatory shock as part of severe sepsis or in meningococemia should be handled in neurointensive care unit. Treatment should consist of a 30 degree head-up position, head midline, minimal suction, deep sedation, normo- or moderate hypothermia and strict avoidance of hypercapnia (Nadel and Kroll, 2007). Head elevation and hyperosmolar agents are recommended for the management of cerebral oedema but have never been systematically evaluated in the context of bacterial meningitis. As a hyperosmolar agent, 20% mannitol may be given intravenously either as a bolus injection of 1 g/kg over 10 to 15 min, repeated at 4 to 6 hour intervals, or in smaller but frequent doses (0.25 mg/kg every 2 to 3 hours), to maintain a target serum osmolality of 315 to 320 mOsm/l [IVC]. CSF pressure monitoring may be helpful in cases where CSF drainage (ventricular) is under consideration for obstructive hydrocephalus, and the decision to perform the procedure should be based on patient's level of consciousness and the degree of ventricular dilatation visualized in brain imaging (computed tomography [CT] or magnetic resonance imaging [MRI]) [IVC]. Seizures are frequent in ABM and are associated with severe inflammation, structural brain lesion and pneumococcal meningitis may increase mortality (Zoons et al., 2008) and should be treated with a parenteral anticonvulsant, such as phenytoin (fosphenytoin) [IIIB]. Prophylactic anticoagulation to prevent deep vein thrombosis may be considered in patients who do not have coagulopathy and are considered to be at a high risk of deep vein thrombosis (e.g., obesity and recent hip surgery). Heparin was considered beneficial in a retrospective study of patients with septic cavernous sinus thrombosis; however, experience with therapeutic anticoagulation for venous sinus thrombosis in ABM is limited and is best reserved for patients who deteriorate neurologically because of venous sinus thrombosis and require close monitoring of coagulation profile and brain imaging [IVC].

### Managing Complications of ABM

All survivors of ABM should be offered access to neurology service

Audiometry is recommended in recovering patients with suspected hearing impairment.

Seizures in patients with ABM may be early (acute symptomatic epilepsy) or delayed, appearing after several months or years. Long-term antiepileptic drug therapy is recommended in patients with late-onset seizures. For patients with acute symptomatic seizures, antiepileptic drug therapy may be withdrawn after 1 year, in the absence of seizure recurrence and structural brain (cortical) injury as visualized in brain

imaging.

Driving restriction in adults may apply if they had seizures, or have functional impairment such as visual field defect and limb weakness.

### Prevention of Secondary Cases of ABM

All cases of suspected meningococcal or Hib meningitis should be reported urgently to the local public health authorities [IVC].

Chemoprophylaxis with either oral rifampicin (600 mg 12 hourly for 48 hours), ciprofloxacin (500 mg single dose) or ceftriaxone (IV or IM injection of a single 1 g dose) should be given to those adults with meningococcal infection who were treated without a third-generation cephalosporin [IVC].

Chemoprophylaxis with either rifampicin, ciprofloxacin or ceftriaxone should be given to household or close contacts of patients with suspected or proven meningococcal or Haemophilus infection [IVC].

A therapeutic 7-day course of phenoxymethyl penicillin or amoxicillin should be considered in addition to chemoprophylaxis for any household or close contact of a patient with meningococcal disease aged <15 years [IVC].

Chemoprophylaxis for meningococcal meningitis is rarely indicated for health-care workers and is only recommended in situations where there has been mouth to mouth contact or direct exposure to infectious droplets from a patient with meningococcal disease [IVC].

Immunization with Meningococcal or *H. influenzae* type B vaccine should be considered in the public health management of an outbreak [IVC].

Primary vaccination against *N. meningitidis* and *H. influenzae* type B infection should be given to all at risk groups [IVC].

Vaccination against *N. meningitidis* type C and *H. influenzae* type B should be given to all children as part of the normal childhood immunization schedule [IVC].

### Definitions:

#### Evidence Classification Scheme for a Diagnostic Measure

Class I: A prospective study in a broad spectrum of persons with the suspected condition, using a "gold standard" for case definition, where the test is applied in a blinded evaluation, and enabling the assessment of appropriate tests of diagnostic accuracy

Class II: A prospective study of a narrow spectrum of persons with the suspected condition, or a well-designed retrospective study of a broad spectrum of persons with an established condition (by "gold standard") compared to a broad spectrum of controls, where test is applied in a blinded evaluation, and enabling the assessment of appropriate tests of diagnostic accuracy

Class III: Evidence provided by a retrospective study where either persons with the established condition or controls are of a narrow spectrum, and where test is applied in a blinded evaluation

Class IV: Any design where test is not applied in blinded evaluation OR evidence provided by expert opinion alone or in descriptive case series (without controls)

#### Evidence Classification Scheme for a Therapeutic Intervention

Class I: An adequately powered prospective, randomized, controlled clinical trial with masked outcome assessment in a representative population or an adequately powered systematic review of prospective randomized controlled clinical trials with masked outcome assessment in representative populations. The following are required:

- Randomization concealment

- Primary outcome(s) is/are clearly defined

- Exclusion/inclusion criteria are clearly defined

- Adequate accounting for dropouts and crossovers with numbers sufficiently low to have minimal potential for bias

- Relevant baseline characteristics are presented and substantially equivalent among treatment groups or there is appropriate statistical adjustment for differences

Class II: Prospective matched-group cohort study in a representative population with masked outcome assessment that meets a–e above or a randomized, controlled trial in a representative population that lacks one criteria a–e

Class III: All other controlled trials (including well-defined natural history controls or patients serving as own controls) in a representative population, where outcome assessment is independent of patient treatment

Class IV: Evidence from uncontrolled studies, case series, case reports, or expert opinion

#### Rating of Recommendations for a Diagnostic Measure

Level A rating (established as useful/predictive or not useful/predictive) requires at least one convincing class I study or at least two consistent, convincing class II studies.

Level B rating (established as probably useful/predictive or not useful/predictive) requires at least one convincing class II study or overwhelming class III evidence.

Level C rating (established as possibly useful/predictive or not useful/predictive) requires at least two convincing class III studies.

#### Rating of Recommendations for a Therapeutic Intervention

Level A rating (established as effective, ineffective, or harmful) requires at least one convincing class I study or at least two consistent, convincing class II studies.

Level B rating (probably effective, ineffective, or harmful) requires at least one convincing class II study or overwhelming class III evidence.

Level C rating (possibly effective, ineffective, or harmful) requires at least two convincing class III studies.

Good Practice Points Where there was a lack of evidence but consensus was clear, the Task Force has stated their opinion as good practice points.

## Clinical Algorithm(s)

An algorithm is provided in the original guideline document for emergency management of patients with suspected bacterial meningitis.

## Scope

### Disease/Condition(s)

Community-acquired acute bacterial meningitis (ABM)

Note: The management of hospital acquired ABM and chronic meningitis, tuberculous meningitis inclusive, is not considered in this document.

### Guideline Category

Diagnosis

Evaluation

Management

Prevention

Risk Assessment

Treatment

### Clinical Specialty

Critical Care

Emergency Medicine

Family Practice

Infectious Diseases

Internal Medicine

Neurology

Pediatrics

Pharmacology

## Intended Users

Advanced Practice Nurses

Emergency Medical Technicians/Paramedics

Hospitals

Nurses

Physician Assistants

Physicians

Public Health Departments

## Guideline Objective(s)

To assist neurologists with the diagnosis and treatment of community-acquired acute bacterial meningitis (ABM) in older children and adults based on literature evidence and expert consensus

To propose early diagnosis and treatment of ABM, as soon as possible, and a target time of no longer than 3 hours from door-to-first antibiotic therapy based on secured diagnosis supported by clinical and cerebrospinal fluid (CSF) findings

## Target Population

Older children and adults with community-acquired acute bacterial meningitis (ABM)

## Interventions and Practices Considered

### Diagnosis/Evaluation

Rapid assessment of patients with suspected acute bacterial meningitis (ABM)

Clinical features of ABM

Classic triad: fever, stiff neck, altered mental status

Differential diagnosis

Timeline for admission to hospital and assessment and treatment

Lumbar puncture and cerebrospinal fluid analysis

Signs and symptoms of increased intracranial pressure

Assessment of risk factors for determination of appropriate antibiotic therapy

Microbiological diagnosis

Evaluation for shock, Glasgow Coma Scale, and focal neurological deficit

Computed tomography and magnetic resonance imaging

### Management/Treatment/Prevention

Empirical antibiotic therapy with ceftriaxone or cefotaxime; alternative therapy: meropenem or chloramphenicol or a combination of cephalosporins with vancomycin

Pathogen specific therapy (refer to the "Major Recommendations" field for details)

Adjunctive therapy with dexamethasone in non-immunosuppressed patients with suspected pneumococcal (or *Haemophilus influenza* type B) meningitis

Note: In meningitis caused by other bacterial etiology, routine use of high dose dexamethasone is not recommended.

Other symptomatic and adjunctive treatment (e.g., access to neurology services, audiometry, antiepileptic drugs if indicated)

Prevention of secondary cases of meningitis (e.g., reporting all cases of suspected meningitis to local health authorities, chemoprophylaxis of household or close contacts of patients with meningitis, vaccination)

## Major Outcomes Considered

Incidence of acute bacterial meningitis (ABM)

Sensitivity, specificity, and predictive positive and negative value of diagnostic tests

Effectiveness of treatment

Side effects of therapies

Complications of ABM (e.g., cognitive dysfunction, seizures, chronic fatigue, depression)

Mortality

## Methodology

### Methods Used to Collect/Select the Evidence

Hand-searches of Published Literature (Primary Sources)

Hand-searches of Published Literature (Secondary Sources)

Searches of Electronic Databases

### Description of Methods Used to Collect/Select the Evidence

#### 2008 Original Guideline Document

##### Search Strategy and Selection Criteria

Data for this guideline were identified by searches of MEDLINE, EMBASE, the Cochrane databases and references from relevant articles. Search terms used were (alone and in combination): bacterial meningitis, meningococcal meningitis, pneumococcal meningitis, *Listeria* meningitis, and meningoencephalitis, lumbar puncture (LP), cerebrospinal fluid (CSF), treatment for meningitis, antibiotic, dexamethasone and vaccine.

#### 2013 Reaffirmation

The Cochrane Library (The Cochrane Library 2011, issue 1), Medline and EMBASE were searched for literature published from November 2008 to October 2013. A literature search was undertaken (as indicated in question 1) using the search items "bacterial meningitis", or "acute bacterial meningitis" with the terms "adult", "treatment", "therapy" or "antibiotics". Only articles published in the past 5 years were reviewed. Search items identifying literature on neonatal meningitis, nosocomial meningitis, chronic or recurrent meningitis, tuberculous meningitis, viral meningitis and fungal meningitis were excluded. The reference lists of articles identified by the search strategy were also reviewed. Geographic variations in the demographics, antimicrobial therapy and clinical practice in the selected publications were minimized by restricting the searched items to articles written in English and to those largely originating in the European or North American continents.

The lead author reviewed the literature and determined that no new diagnostic or therapy development was identified that sufficiently altered the existing recommendations in the published guideline on community acquired bacterial meningitis in adults.

### Number of Source Documents

Not stated

### Methods Used to Assess the Quality and Strength of the Evidence

## Rating Scheme for the Strength of the Evidence

### Evidence Classification Scheme for a Diagnostic Measure

Class I: A prospective study in a broad spectrum of persons with the suspected condition, using a "gold standard" for case definition, where the test is applied in a blinded evaluation, and enabling the assessment of appropriate tests of diagnostic accuracy

Class II: A prospective study of a narrow spectrum of persons with the suspected condition, or a well-designed retrospective study of a broad spectrum of persons with an established condition (by "gold standard") compared to a broad spectrum of controls, where test is applied in a blinded evaluation, and enabling the assessment of appropriate tests of diagnostic accuracy

Class III: Evidence provided by a retrospective study where either persons with the established condition or controls are of a narrow spectrum, and where test is applied in a blinded evaluation

Class IV: Any design where test is not applied in blinded evaluation OR evidence provided by expert opinion alone or in descriptive case series (without controls)

### Evidence Classification Scheme for a Therapeutic Intervention

Class I: An adequately powered prospective, randomized, controlled clinical trial with masked outcome assessment in a representative population or an adequately powered systematic review of prospective randomized controlled clinical trials with masked outcome assessment in representative populations. The following are required:

- Randomization concealment

- Primary outcome(s) is/are clearly defined

- Exclusion/inclusion criteria are clearly defined

- Adequate accounting for dropouts and crossovers with numbers sufficiently low to have minimal potential for bias

- Relevant baseline characteristics are presented and substantially equivalent among treatment groups or there is appropriate statistical adjustment for differences

Class II: Prospective matched-group cohort study in a representative population with masked outcome assessment that meets a–e above or a randomized, controlled trial in a representative population that lacks one criteria a–e

Class III: All other controlled trials (including well-defined natural history controls or patients serving as own controls) in a representative population, where outcome assessment is independent of patient treatment

Class IV: Evidence from uncontrolled studies, case series, case reports, or expert opinion

## Methods Used to Analyze the Evidence

Review of Published Meta-Analyses

Systematic Review

## Description of the Methods Used to Analyze the Evidence

For determining the levels of evidence for therapeutic interventions, the European Federation of Neurological Societies (EFNS) guideline was followed (See the "Rating Scheme for the Strength of the Evidence" and "Rating Scheme for the Strength of the Recommendations" fields). Only research papers published in English were considered. Limitations of the search strategy include: non-randomized clinical data, lack of sensitivity and specificity, small numbers of cohorts and case-control studies.

## Methods Used to Formulate the Recommendations

Expert Consensus



## Description of Methods Used to Formulate the Recommendations

Not stated

## Rating Scheme for the Strength of the Recommendations

### Rating of Recommendations for a Diagnostic Measure

Level A rating (established as useful/predictive or not useful/predictive) requires at least one convincing class I study or at least two consistent, convincing class II studies.

Level B rating (established as probably useful/predictive or not useful/predictive) requires at least one convincing class II study or overwhelming class III evidence.

Level C rating (established as possibly useful/predictive or not useful/predictive) requires at least two convincing class III studies.

### Rating of Recommendations for a Therapeutic Intervention

Level A rating (established as effective, ineffective, or harmful) requires at least one convincing class I study or at least two consistent, convincing class II studies.

Level B rating (probably effective, ineffective, or harmful) requires at least one convincing class II study or overwhelming class III evidence.

Level C rating (possibly effective, ineffective, or harmful) requires at least two convincing class III studies.

Good Practice Points Where there was a lack of evidence but consensus was clear, the Task Force has stated their opinion as good practice points.

## Cost Analysis

A formal cost analysis was not performed and published cost analyses were not reviewed.

## Method of Guideline Validation

Peer Review

## Description of Method of Guideline Validation

The guidelines were validated according to the European Federation of Neurological Societies (EFNS) criteria (see the "Availability of Companion Documents" field in this summary).

## Evidence Supporting the Recommendations

## References Supporting the Recommendations

Nadel S, Kroll JS. Diagnosis and management of meningococcal disease: the need for centralized care. FEMS Microbiol Rev. 2007 Jan;31(1):71-83. [102 references] [PubMed](#)

Zoons E, Weisfelt M, de Gans J, Spanjaard L, Koelman JH, Reitsma JB, van de Beek D. Seizures in adults with bacterial meningitis. Neurology. 2008 May 27;70(22 Pt 2):2109-15. [PubMed](#)

## Type of Evidence Supporting the Recommendations

The type of supporting evidence is identified and graded for selected recommendations (see "Major Recommendations" field).

## Benefits/Harms of Implementing the Guideline Recommendations

### Potential Benefits

Early diagnosis and treatment of acute bacterial meningitis (ABM) in older children and adults based on secured diagnosis supported by clinical and cerebrospinal fluid (CSF) findings

### Potential Harms

#### Adverse Effects of Medications

*Linezolid* requires to be used with caution, because of adverse events and drug interactions, particularly in the intensive care when vasoactive agents are used.

By reducing subarachnoid space inflammation and blood brain barrier permeability, *steroids* may lower cerebrospinal (CSF) penetration of antibiotics, and patients receiving vancomycin for penicillin-resistant pneumococcal meningitis require close clinical and CSF monitoring.

One study concluded that the *steroid* treatment reduced neurological complications of meningitis, but secondary fever, gastrointestinal manifestations and neuropsychiatric symptoms were common side effects in the steroid-treated group.

## Contraindications

### Contraindications

#### Contraindications for Lumbar Puncture

##### *Absolute Contraindications*

Signs of raised intracranial pressure (papilloedema, decerebrate posturing)

Local skin infection in needle track

Evidence of obstructive hydrocephalus, cerebral oedema or herniation in computed tomography [CT] (or magnetic resonance [MR]) scan of brain

##### *Relative Contraindications*

Sepsis or hypotension (systolic blood pressure <100 mm Hg, diastolic blood pressure <60 mm Hg); patients should be stabilized first

Coagulation disorder (disseminated intravascular coagulopathy, platelet count <50 000/mm<sup>3</sup>, therapeutic use of warfarin); appropriate correction first

Presence of focal neurological deficit, especially when posterior fossa lesion is suspected\*

Glasgow coma score of 8 or less\*

Epileptic seizures\*

\* In all these cases, CT (or MR) scan of brain should be the first step. Isolated single cranial nerve palsy without papilloedema does not necessarily contraindicate lumbar puncture (LP) without brain imaging.

## Implementation of the Guideline

### Description of Implementation Strategy

The European Federation of Neurological Societies has a mailing list and all guideline papers go to national societies, national ministries of health, World Health Organisation, European Union, and a number of other destinations. Corporate support is recruited to buy large numbers of reprints of the guideline papers and permission is given to sponsoring companies to distribute the guideline papers from their commercial channels, provided there is no advertising attached.

## Implementation Tools

Clinical Algorithm

For information about availability, see the *Availability of Companion Documents* and *Patient Resources* fields below.

## Institute of Medicine (IOM) National Healthcare Quality Report Categories

### IOM Care Need

Getting Better

Staying Healthy

### IOM Domain

Effectiveness

Timeliness

## Identifying Information and Availability

### Bibliographic Source(s)

Chaudhuri A, Martinez-Martin P, Kennedy PG, Andrew Seaton R, Portegies P, Bojar M, Steiner I, EFNS Task Force. EFNS guideline on the management of community-acquired bacterial meningitis: report of an EFNS Task Force on acute bacterial meningitis in older children and adults. *Eur J Neurol*. 2008 Jul;15(7):649-59. [13 references] [PubMed](#)

### Adaptation

Not applicable: The guideline was not adapted from another source.

### Date Released

2008 Jul (reaffirmed 2013)

### Guideline Developer(s)

European Academy of Neurology - Medical Specialty Society

## Source(s) of Funding

European Federation of Neurological Societies

## Guideline Committee

European Federation of Neurological Societies Task Force on Acute Bacterial Meningitis in Older Children and Adults

## Composition of Group That Authored the Guideline

*Task Force Members:* A. Chaudhuri, Department of Neurology, Essex Centre for Neurological Sciences, Queen's Hospital, Romford, UK; P. M. Martin, Neuroepidemiology Unit, National Centre for Epidemiology, Carlos III Institute of Health, Madrid, Spain; P. G. E. Kennedy, Division of Clinical Neurosciences, University of Glasgow, Glasgow, UK; R. Andrew Seaton, Department of Infectious Diseases and General Medicine, Brownlee Centre, Gartnavel General Hospital, Glasgow, UK; P. Portegies, Department of Neurology, OLVG Hospital, Amsterdam, The Netherlands; M. Bojar, Charles University Prague 2nd Medical School Department of Neurology, University Hospital Motol, Prague, Czech Republic; I. Steiner, Neurological Sciences Unit, Hadassah University Hospital, Jerusalem, Israel

## Financial Disclosures/Conflicts of Interest

Not stated

## Guideline Status

This is the current release of the guideline.

The European Federation of Neurological Societies (EFNS) reaffirmed the currency of this guideline in 2013.

## Guideline Availability

Electronic copies: Available in portable document format (PDF) from the [European Federation of Neurological Societies \(EFNS\) Web site](#)

Print copies: Available from Dr Abhijit Chaudhuri, Department of Neurology, Essex Centre for Neurological Sciences, Queen's Hospital, Romford, UK; Phone: 01708 435000; Fax: 01708 503756; E-mail: [chaudhuria@gmail.com](mailto:chaudhuria@gmail.com)

## Availability of Companion Documents

The following is available:

- Brainin M, Barnes M, Baron JC, Gilhus NE, Hughes R, Selmaj K, Waldemar G; Guideline Standards Subcommittee of the EFNS Scientific Committee. Guidance for the preparation of neurological management guidelines by EFNS scientific task forces – revised recommendations 2004. *Eur J Neurol*. 2004 Sep;11(9):577-81. Electronic copies: Available in Portable Document Format (PDF) from the [European Federation of Neurological Societies Web site](#) .

## Patient Resources

None available

## NGC Status

This NGC summary was completed by ECRI Institute on April 28, 2009. The information was verified by the guideline developer on June 9,

2009. This summary was updated by ECRI Institute on July 27, 2010 following the FDA drug safety communication on Heparin. This summary was updated by ECRI Institute on November 22, 2011 following the U.S. Food and Drug Administration (FDA) advisory on Zyvox (linezolid). This summary was updated by ECRI Institute on October 25, 2013 following the U.S. Food and Drug Administration advisory on Fluoroquinolone Antibacterial Drugs. The currency of the guideline was reaffirmed by the developer in 2013 and this summary was updated by ECRI Institute on December 19, 2013. This summary was updated by ECRI Institute on March 10, 2014 following the U.S. Food and Drug Administration advisory on Low Molecular Weight Heparins. This summary was updated by ECRI Institute on May 18, 2016 following the U.S. Food and Drug Administration advisory on Fluoroquinolone Antibacterial Drugs.

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